

What is claimed is:

1. A method of maintaining communication access to a mobile node comprising:
  - intercepting, at a router, a location update message relating to the mobile node;5 and
  - binding an address of the mobile node with a care of address received in the location update message.
2. The method of claim 1 further comprising substituting an address of the router for the care of address in the location update message and forwarding the location update message to a home agent of the mobile node.10
3. The method of claim 1 further comprising terminating the location update message.15
4. The method of claim 1 wherein the mobile node is a mobile IP host.20
5. The method of claim 1 wherein the router is a correspondent agent for a correspondent host and wherein the act of binding forms a tunnel for messages to the mobile node that avoids a home agent of the mobile node.
6. A method of communicating between the mobile node and the correspondent host according to claim 5 further comprising:
  - receiving a data message emanating from the correspondent host; and
  - transmitting the data message toward the mobile node via the tunnel.25
7. The method of claim 6 wherein transmitting the data message comprises encapsulating the data message with a header addressed to the care of address.
8. The method of claim 6 wherein the care of address comprises an address unique to the mobile node and transmitting the data message comprises substituting the care of address into the data message.30

9. The method of claim 5 wherein the act of binding takes place in a redirector router.
10. The method of claim 9 further comprising commanding the correspondent host to send messages meant for the mobile node to the redirector router.
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11. The method of claim 1 wherein the router is an agent for a mobile correspondent host.
12. A method of setting up communications between a mobile node and a correspondent host, the mobile node having an associated home agent, the method comprising:  
10 intercepting, at a router, a location update message relating to the mobile node;  
and  
15 forming, in response to said location update message, a tunnel that avoids the home agent for communications with the mobile node.
13. The method of claim 12 wherein the mobile node is a mobile IP host and the act of forming comprises binding an address of the mobile IP host with a care of address received in the location update message.
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14. A method of communicating between the mobile IP host and the correspondent host according to claim 12 further comprising:  
receiving a data message emanating from the correspondent host; and  
transmitting the data message toward the mobile IP host via the tunnel.
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15. The method of claim 14 wherein transmitting the data message via the tunnel comprises encapsulating the data message with a header addressed to a care of address for the mobile node.
16. The method of claim 14 wherein transmitting the data message comprises substituting a care of address unique to the mobile node into the data message.

17. The method of claim 12 wherein the router instructs a redirector router to perform the act of forming the tunnel.

18. The method of claim 17 further comprising commanding the correspondent host to

5 send messages meant for the mobile node to the redirector router.

19. The method of claim 12 wherein the correspondent host is mobile.

20. A method of setting up communications with a mobile node that is remote from its

10 home agent comprising:

intercepting at a correspondent router a location update message addressed to a correspondent host;

determining which router will serve as a redirector from the correspondent host to a care of address in the location update message; and

15 forming a tunnel that avoids the home agent for communicating with the mobile node from the redirector router.

21. The method of claim 20 wherein the act of forming a tunnel comprises binding, in the redirector router, an address of the mobile node with the care of address.

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22. A method of communicating with the mobile node according to claim 20 comprising:

intercepting, at the redirector router, a message directed to the mobile node emanating from the correspondent host; and

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transmitting the message toward the mobile node via the tunnel.

23. The method of claim 22 wherein transmitting comprises:

substituting the care of address into the message; and

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forwarding the message toward the care of address wherein the care of address is unique to the mobile node.

24. The method of claim 22 wherein transmitting comprises encapsulating the data message with a header addressed to the care of address.

25. The method of claim 20 further comprising commanding the correspondent host to send messages meant for the mobile node to the redirector router.

26. A method for communicating with a mobile node traveling in a domain remote from its home agent comprising:

intercepting a location update message from the mobile node at a border router

10 having a binding for the mobile node; and

revising the binding to include a care of address received in the location update message.

27. The method of claim 26 wherein the mobile node is a mobile IP host and further comprising terminating the location update message.

28. A method for enabling communications with a mobile node comprising:

changing location of the mobile node; and

sending a location update message with a Router Alert, wherein the Router Alert

20 permits a suitably programmed router to intercept the location update message and bind an address of the mobile node with a care of address received in the location update message.

29. The method of claim 28 wherein said act of sending a location update message comprises sending a registration request toward a home agent of the mobile node.

30. The method of claim 29 wherein the registration request is intercepted at a border router and further comprising substituting an address of the border router for the care of address in the registration request and forwarding the registration request toward the home agent.

31. The method of claim 29 wherein the registration request is intercepted at a border router in a domain in which the mobile node and a correspondent host are located and further comprising transmitting from the border router toward the correspondent host a binding update message having the care of address.  
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32. The method of claim 29 wherein the registration request is intercepted at a border router having a binding for the mobile node and further comprising revising the binding to include the care of address received in the location update message.
- 10 33. The method of claim 32 further comprising terminating the location update message.
34. The method of claim 28 further comprising receiving at a home agent notice of the change in the location of the mobile node and wherein said act of sending comprises sending a binding update toward a correspondent host.  
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35. The method of claim 34 wherein the binding update is intercepted at a correspondent agent and binding forms a tunnel.
- 20 36. A system for setting up communications between a mobile node and a correspondent host comprising:
  - a home agent associated with the mobile node; and
  - a correspondent agent adapted to intercept a first location update and to form a tunnel for messages from the correspondent host directed to the mobile node.
- 25 37. The system of claim 36 wherein said correspondent agent comprises an interceptor router.
38. The system of claim 37 wherein said correspondent agent further comprises a redirector router, wherein messages directed to the mobile node are sent from the correspondent host through said redirector router.  
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39. The system of claim 36 further comprising a border router adapted to intercept a second location update message from the mobile node, to substitute an address of the border router for a care of address in the second location update message and then to forward the second location update to said home agent, wherein said home agent  
5 transmits the first location update toward the correspondent host in response to the second location update and the tunnel extends from said correspondent agent to said border router.

40. A method for enabling communications with a mobile node comprising:

10 changing location of the mobile node; and  
sending a location update message with an Edge Router Alert, wherein the Edge Router Alert is ignored by non-border routers but permits a suitably programmed border router to intercept the location update message and bind an address of the mobile node with a care of address received in the location update message.

15 41. The method of claim 40 wherein said act of sending a location update message comprises sending a registration request toward a home agent of the mobile node.

20 42. The method of claim 41 wherein the registration request is intercepted at a border router and further comprising substituting an address of the border router for the care of address in the registration request and forwarding the registration request toward the home agent.

25 43. The method of claim 41 wherein the registration request is intercepted at a border router having a binding for the mobile node and further comprising revising the binding to include the care of address received in the location update message.

44. The method of claim 43 further comprising terminating the location update message.

30 45. A system for setting up tunnels to a mobile node in a first domain remote from the mobile node's home domain comprising:

45. a home agent associated with the mobile node and located in the home domain;  
and

5 a first border router in the first domain adapted to intercept a first location update sent by the mobile node and addressed to said home agent, said first border router binding an address of the mobile node with a care of address received in the first location update so that said first border router can serve as a tunnel endpoint to the mobile node.

10 46. The system of claim 45 further comprising a second border router in a second domain encompassing the first domain adapted to intercept the first location update after having been processed through said first border router, said second border router binding an address of the mobile node with an address of said first border router so that said second border router serves as a point along the tunnel to the mobile node.

15 47. The system of claim 46 wherein said second border router includes means for updating the binding in response to location updates for the mobile node received while the binding already exists for the address of the mobile node and for terminating such location updates.

20 48. The system of claim 45 wherein said first border router is adapted to substitute an address of the first border router for the care of address in the first location update message and then to forward the first location update toward said home agent.

25 49. A computer program product for maintaining communication access to a mobile node, the computer program product comprising a computer usable medium having computer program code thereon, said computer program code comprising:

program code for intercepting a location update message relating to the mobile node; and

program code for binding an address of the mobile node with a care of address received in the location update message.

50. The computer program product of claim 49 for use in a router further comprising program code for substituting an address of the router for the care of address in the location update message and forwarding the location update message to a home agent of the mobile node.

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51. The computer program product of claim 49 further comprising program code for terminating the location update message.

10 52. The computer program product of claim 49 wherein the program code for binding forms a tunnel for messages to the mobile node that avoids a home agent of the mobile node.

15 53. A computer program product for communicating between the mobile node and the correspondent host according to claim 52 further comprising program code for transmitting, in response to receiving a data message emanating from the correspondent host, the data message toward the mobile node via the tunnel.

20 54. The computer program product of claim 53 wherein the program code for transmitting the data message comprises program code for encapsulating the data message with a header addressed to the care of address.

25 55. The computer program product of claim 53 wherein the care of address comprises an address unique to the mobile node and the program code for transmitting the data message comprises program code for substituting the care of address into the data message.

56. A computer program product for setting up communications with a mobile node that is remote from its home agent, the computer program product comprising a computer usable medium having computer program code thereon, said computer program code comprising:

program code for intercepting at a correspondent router a location update message addressed to a correspondent host;

program code for determining which router will serve as a redirector from the correspondent host to a care of address in the location update message; and

5 program code for instructing formation of a tunnel that avoids the home agent for communicating with the mobile node from the redirector router.

57. The computer program product of claim 56 wherein the program code for instructing formation of a tunnel instructs the redirector router to bind an address of the mobile node  
10 with the care of address.

58. The computer program product of claim 56 further comprising program code for commanding the correspondent host to send messages meant for the mobile node to the redirector router.

15 59. A computer program product for use in a border router in a domain where a mobile node is remote from the mobile node's home agent, the computer program product comprising a computer usable medium having computer program code thereon, said computer program code comprising:

20 program code for binding an address of the mobile node with a first care of address;

program code for intercepting a location update message from the mobile node;  
and

25 program code for revising the binding to replace the first care of address with a second care of address received in the location update message.

60. The computer program product of claim 59 further comprising program code for terminating the location update message.

61. A computer program product for use in a mobile node, the computer program product comprising a computer usable medium having computer program code thereon, said computer program code comprising:  
5 program code, responsive to a change in location of the mobile node, for sending a location update message with a Router Alert, wherein the Router Alert permits a suitably programmed router to intercept the location update message and bind an address of the mobile node with a care of address received in the location update message.
- 10 62. The computer program product of claim 61 wherein said program code for sending a location update message comprises program code for sending a registration request toward a home agent of the mobile node.
- 15 63. The computer program product of claim 62 wherein the registration request is intercepted at a border router and further comprising substituting an address of the border router for the care of address in the registration request and forwarding the registration request toward the home agent.
- 20 64. A computer program product for use in a mobile node, the computer program product comprising a computer usable medium having computer program code thereon, said computer program code comprising:  
25 program code, responsive to a change in location of the mobile node, for sending a location update message with an Edge Router Alert, wherein the Edge Router Alert is ignored by non-border routers but permits a suitably programmed border router to intercept the location update message and bind an address of the mobile node with a care of address received in the location update message.
- 30 65. The computer program product of claim 64 wherein said program code for sending a location update message comprises program code for sending a registration request toward a home agent of the mobile node.